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GB 2108857 A
DE 008710893 U
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US 2132647 A

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Other: Online: JAPIO, WPI, EPODOC

(54) Abstract Title: **A constructional toy consisting of shaped blocks which are joined together by pegs which are inserted into openings in the blocks**

(57) A building element 14, 16 is described which is securable to other similar building elements for creating model structures. Each element 14, 16 comprises a block having similarly proportioned side faces and two similarly proportioned end faces each of which includes at least one opening 28, 30 for receiving a peg joining it to another block. One of the side faces includes N spaced apart openings 36, 42, 44 and an adjoining side face includes N+1 spaced apart similar openings 38, 40, 46, 48, 50. Each block is of constant cross-section from one end to the other, and may be square, rectangular, triangular, trapezoidal or hexagonal. At least one of the side faces may be curved and the or each end face maybe inclined so that the block comprises a solid trapezium. The pegs may be rigid and straight or may be formed with a knee or elbow between two straight ends, or may be formed from a material which can be bent. The pegs can be circular, square, triangular or hexagonal in cross-section to fit in to similarly shaped openings in the faces of the block. A kit of parts comprising blocks and pegs further includes a flat base on which blocks can be arranged and secured by pegs fitted into openings in the underside of the blocks and into holes in the flat base.

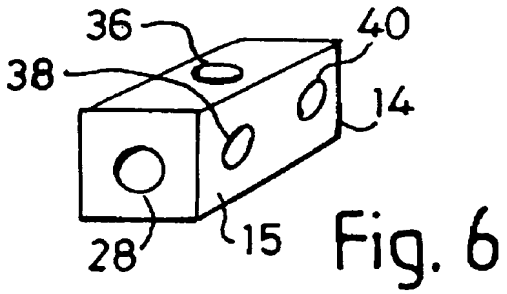

Fig. 6

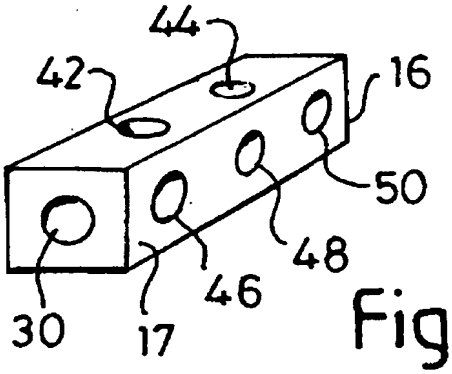

Fig. 9

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

Fig. 1

Fig. 1A

Fig. 2

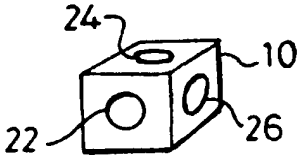


Fig. 3

Fig. 4

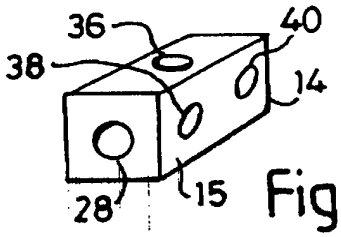


Fig. 6

Fig. 5

Fig. 7

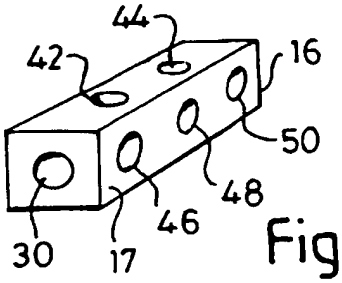


Fig. 9

Fig. 8

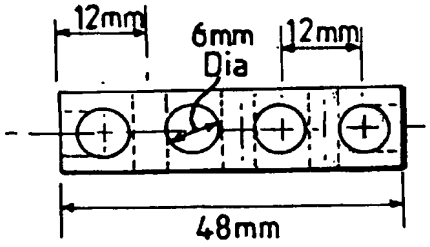


Fig.10

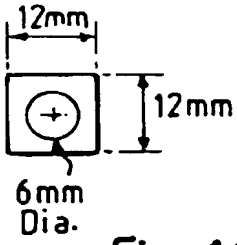


Fig.11

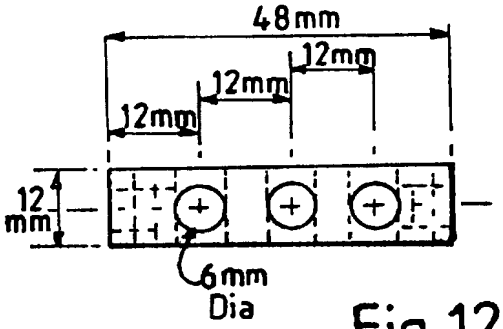


Fig.12

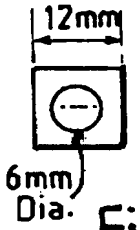


Fig.13

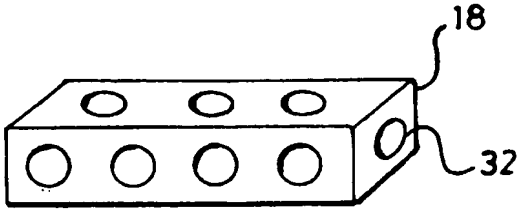


Fig.14

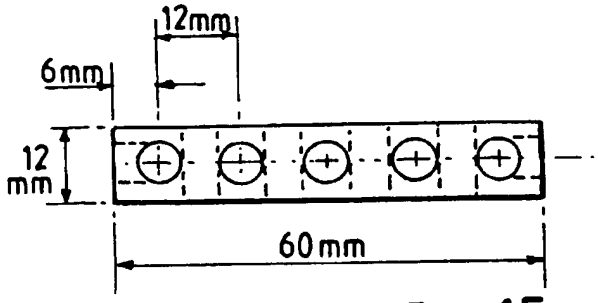


Fig. 15

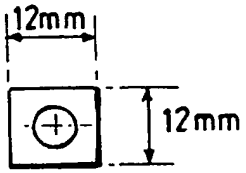


Fig. 16

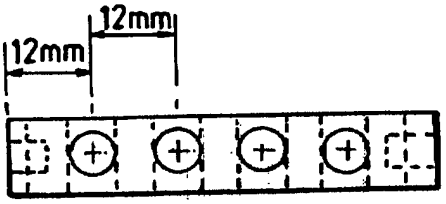


Fig. 17

Fig. 18

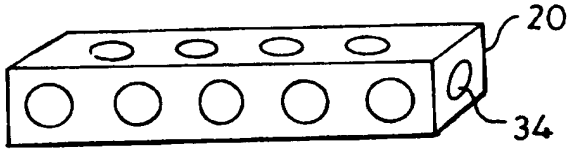


Fig. 19

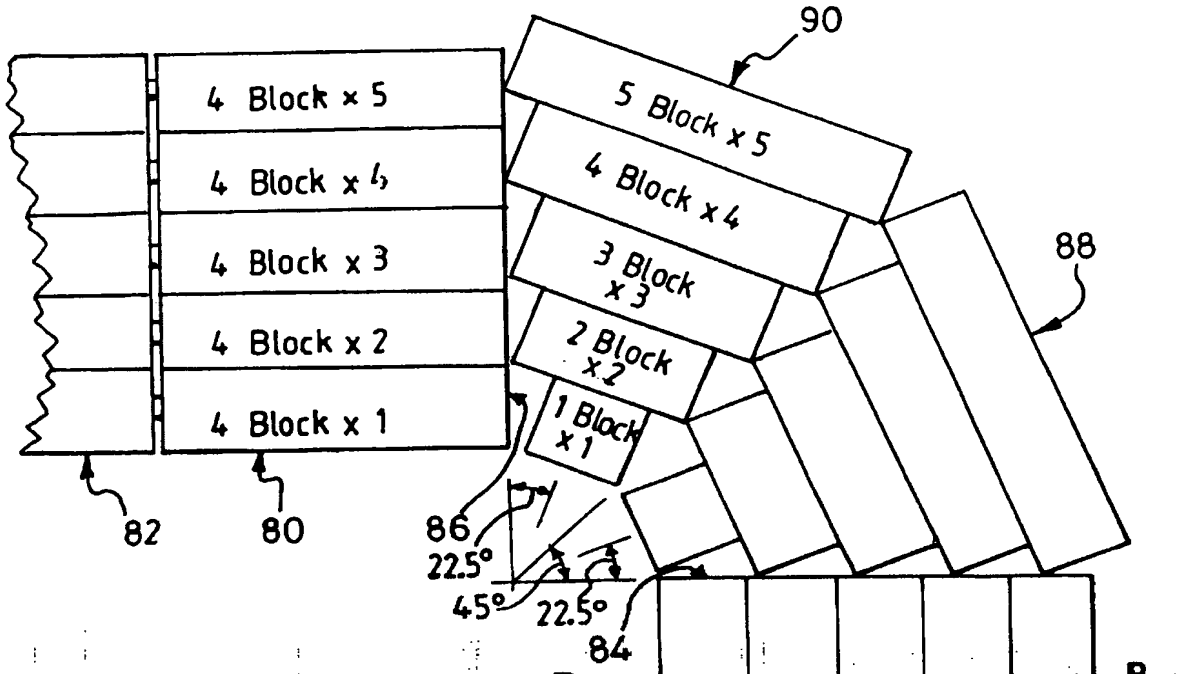


Fig. 20A

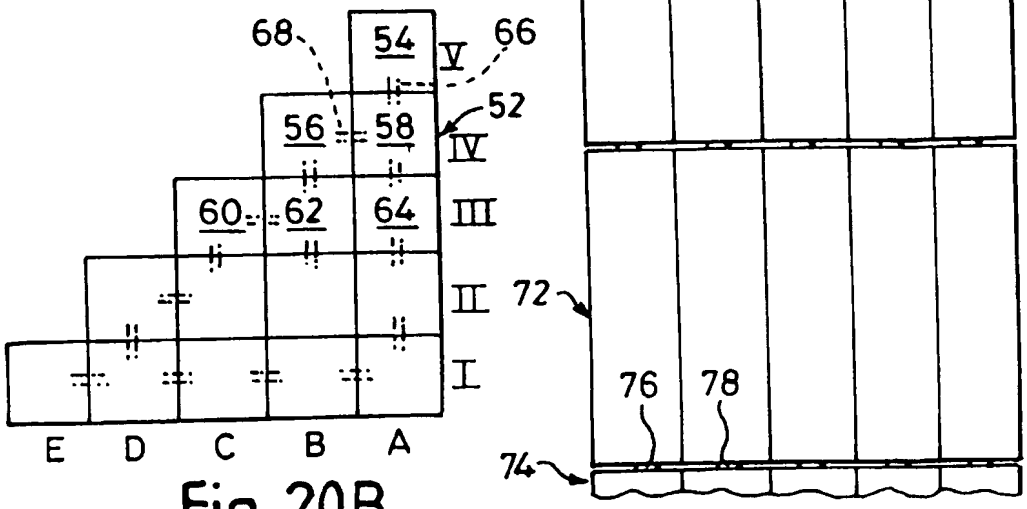


Fig. 20B

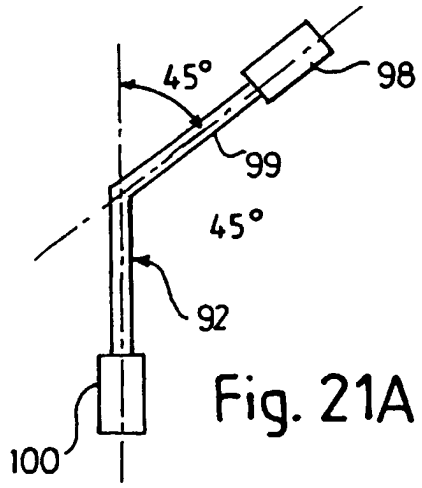


Fig. 21A

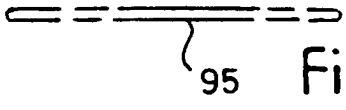


Fig. 21F

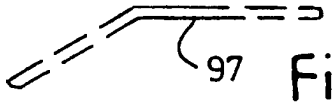


Fig. 21G

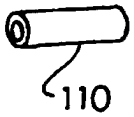


Fig. 21H

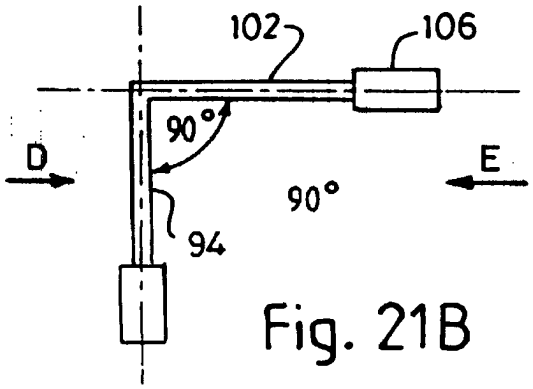
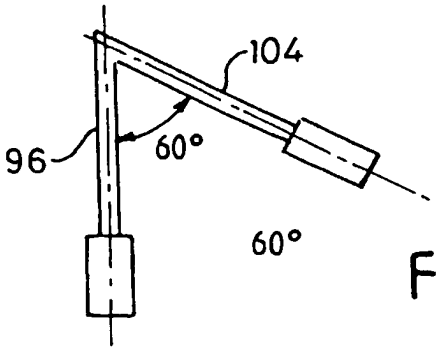


Fig. 21B

Fig. 21D

Fig. 21E



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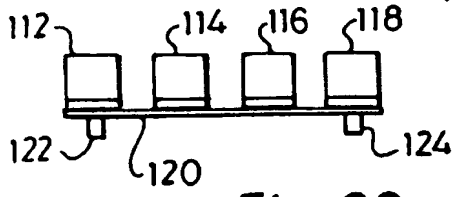

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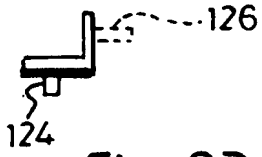

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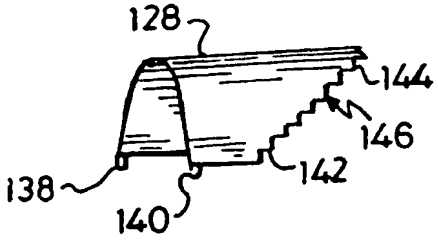


Fig. 24

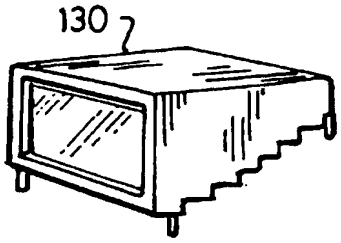
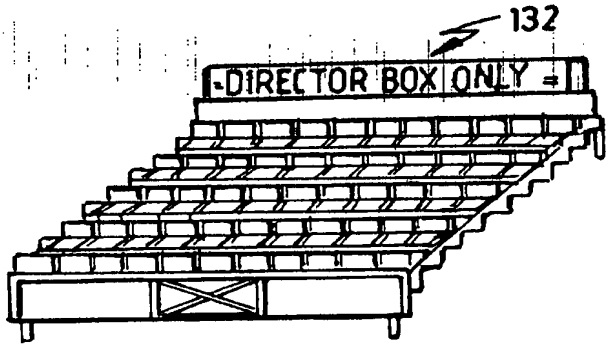


Fig. 25



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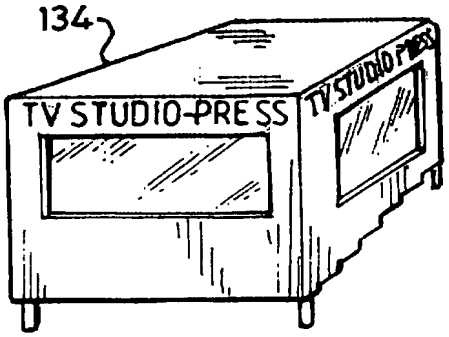


Fig. 26

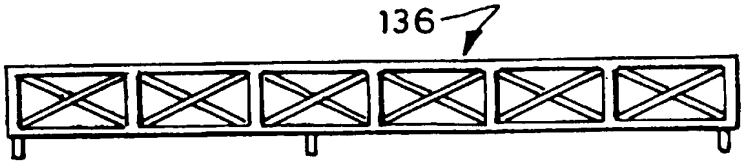


Fig. 28

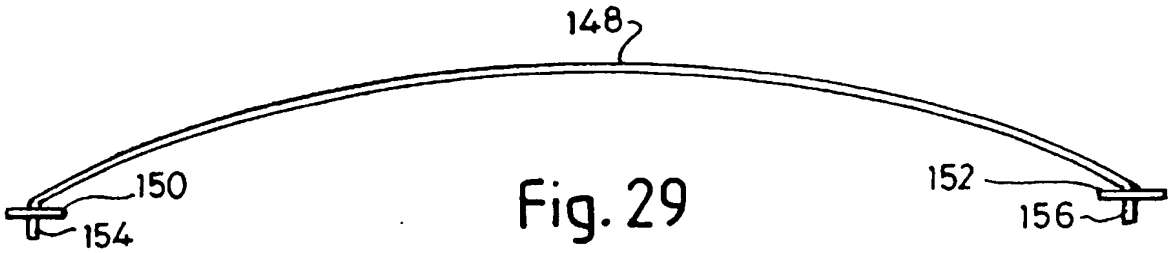


Fig. 29

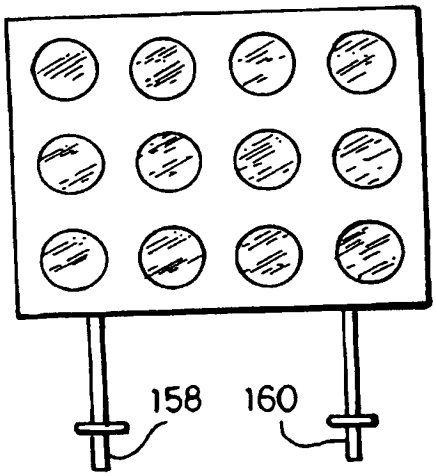


Fig. 30

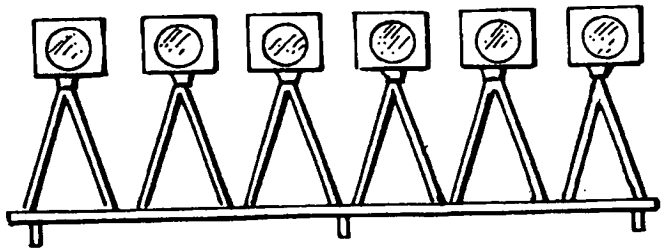


Fig. 31

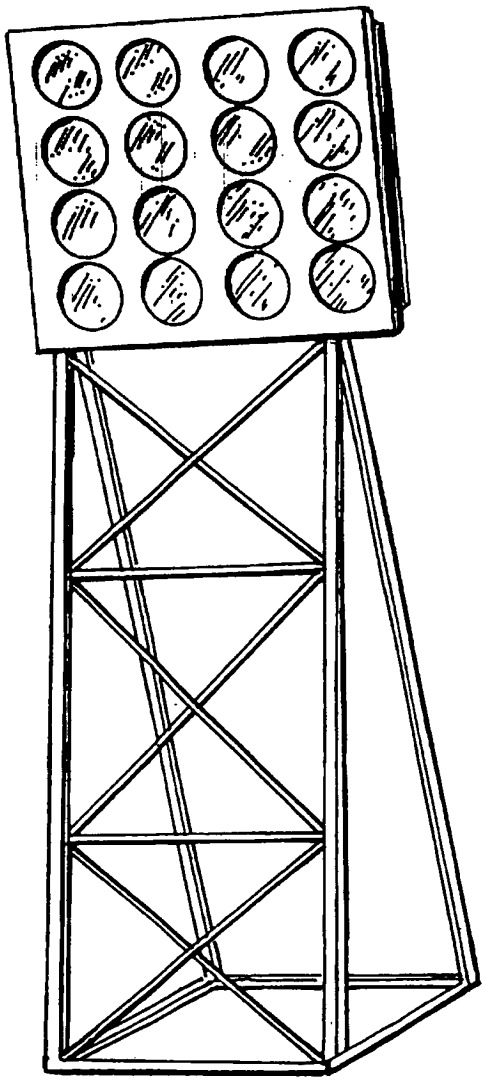
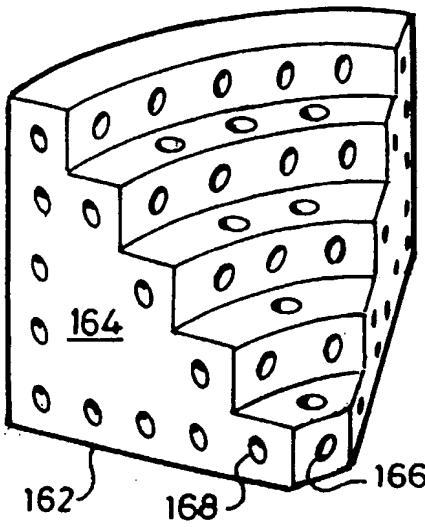


Fig. 32

Fig. 33



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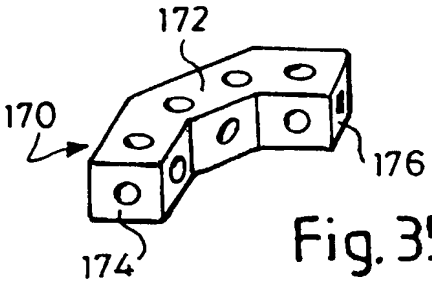
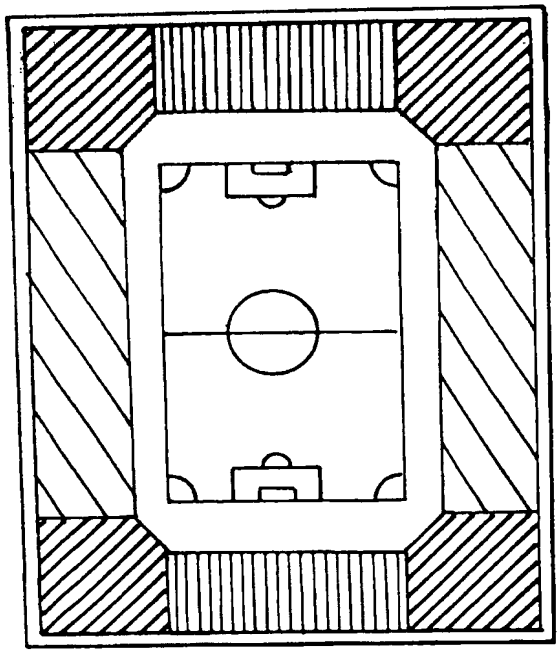


Fig. 35



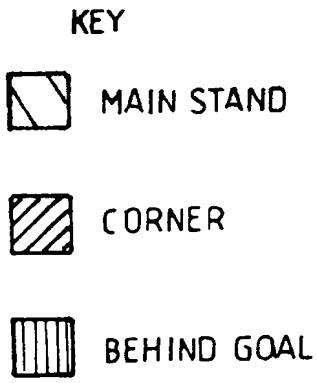


Fig. 36

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Title: Construction kit

Field of the invention

This invention concerns construction kits, typically but not exclusively in the form of toys or playthings.

Background

Kits made up of a large number of similar parts which can be assembled to form models of buildings and other structures are known. Some have relied on a water based adhesive or cement to bind miniature building blocks in the form of brickwork. Others have employed plastics bricks adapted to slide between upright metal rods which hold the bricks in place and are hidden by the edges of the bricks when the latter are stacked one upon another between the rods. Construction kits have relied on nuts and bolts to hold together pre-formed metal components and one of the most popular kits sold under the trade name LEGO RTM has relied on resilient engagement of generally cylindrical spaced apart upstanding protrusions on one face of a brick-like component in a recess or cavity in a face of another similar component, each component being provided with opposite faces bearing the upstanding protrusions on one face and providing the cavity or recess in the opposite face, so that components can be stacked one on top of another. However the number and spacing of the protrusions limits the number of ways in which such components can be arranged relative to one another, and the components cam only be arranged one above another, whether staggered or aligned.

It is an object of the present invention to provide a modelling kit in which the component parts can be readily formed from plastics materials, if desired, by an injection moulding

process, but which can be fitted together in a larger number of different ways, relative to the restricted number of ways in which the component parts of some of the earlier constructions kits can be assembled.

It is also an object of the present invention to more readily allow structures to be built up which do not have simple 90° corner, but when viewed in plan have multifaceted corners, such as one, two or three faceted corners, in which each corner can be thought of as being composed of one, two or three wedges, each subtending an angle of 90°, 45° or 30° respectively.

It is also an object of the present invention to provide a construction kit in which the basic building blocks are adapted to have readily fitted thereto co-operating parts such as cladding panels, roofing structures or canopies, and seats and advertising hoardings, as in a model stadium.

Summary of the invention

According to the present invention a building element which is securable to other similar building elements for creating a basic structure comprises a block having similarly proportioned side faces and two similarly proportioned end faces each of which includes at least one opening therein for receiving a peg by which an end face of one block can be joined to the end face of another, and wherein one of the side faces includes N spaced apart openings and an adjoining side face includes (N+1) spaced apart similar openings, where N is a whole number equal to or greater than 1, and the openings in the side faces are also for receiving pegs by which blocks can be joined or secured in place.

Preferably the openings are equally spaced apart.

Preferably the openings are arranged centrally of the side face.

Typically the openings in the side and end faces are all the same size so that the pegs for joining blocks end to end or side face to side face can also all be the same size.

The cross-sectional shape of the pegs may be circular, but if preferred other cross-sectional shapes may be employed such as triangular, square, or hexagonal, and the holes are shaped accordingly.

By using a circular cross section peg and circular holes, one block can be rotated relative to another if desired. However in general, particularly when using the blocks to create a model building, bridge or other structure, the blocks will not normally need to be rotatable relative to one another, and will normally be linked end to end or side by side, with their faces aligned, and therefore it may be preferable for the pegs to be non-rotatable within the openings in the faces of the blocks, so that when joined to one or more other blocks, the interengagement of the peg or pegs will prevent relative rotation between blocks and will maintain whatever chosen alignment has been selected.

According to a preferred feature of the invention the openings may be for example triangular or square or hexagonal in cross section and two types of peg may be provided, one type having a cross section corresponding to that of the openings (e.g. either triangular or square or hexagonal) and dimensioned to be a tight sliding fit within the openings, so that when two blocks are joined thereby, no relative rotation between the two blocks can occur, and the other type having a circular cross section of a diameter such that the peg can be received as a tight sliding fit within the non-circular (e.g. either triangular or square or hexagonal) openings, so that if relative rotation is required to allow one block to be positioned at an angle to another to achieve a particular effect, this can be achieved by using a circular cross section peg instead of a non-circular cross section peg, for the junction concerned.

Blocks may be of different length and depending on their length can have a corresponding number of openings. Thus the smallest blocks will have one opening on one face and two openings on an adjoining face, the next size can have two openings in one face and three

on an adjoining face, the next size can have three on one face and four on an adjoining face, and so on.

The blocks may be solid or hollow and may be of wood or metal or plastics or a combination of any of the aforesaid. Typically they are formed from a plastics material by moulding, typically injection moulding. One side face of a block may be left open and a separate panel may be removably fitted to close the opening.

The blocks may be of constant cross section from one end face to the other with a commensurate number of side faces.

Preferably the block cross section is square although rectangular, triangular, trapezoidal or hexagonal cross sectional shapes may be employed instead.

For some applications blocks may include one or more curved faces.

Blocks may be constructed in accordance with the invention in which the or each end face is inclined to some of the sides so that the block comprises a solid trapezium. Typically both ends are so inclined and preferably both are inclined by the same amount so as to form a so-called regular solid trapezium.

Typically the acute angle between the or each end and one of the parallel sides is 75°, 67.5°, 60° or 45° so that if placed end to end with a similarly shaped block, the length dimension or axis of one block will subtend an angle of 30°, 45°, 60°, 75° or 90° to that of the adjoining block.

Different angles between adjoining blocks can be obtained by placing end to end trapezoidal blocks having inclined end faces, or the square end face of a standard rectilinear block in contact with an inclined face of a trapezoidal block.

The blocks may be all the same colour, or differently coloured and one end face may be differently coloured from the other, and side faces may also be differently coloured one from another and/or from colour(s) of the end faces.

Where blocks are designed to perform a specific function, they may be colour coded to indicate this. Thus for example, blocks specifically intended to be joined end to end may have a unique colour on each of their end faces to signify this. Where end faces are inclined, differently angled end faces may be of different colours so that end faces which are similarly inclined (e.g. at 45°) will be all the same colour.

Advantageously side faces having an even number of openings may be one colour and side faces having an odd number of openings may be another colour. This will then facilitate the joining of blocks side by side, since a face having an odd number of openings, if arranged centrally of the faces (as is preferred), will have a central opening which will always register with the central opening in another block having an odd number of openings, whereas the converse is not the case where the faces have an even number of openings.

The colouring of the side and/or end faces may involve colouring the whole of the surface or only a part of the surface or may involve colouring the entrance to the interior of the opening or openings in the face, so that the different colours will tend to be observed as blocks are joined one to another.

The provision of different numbers of openings on different faces allows blocks to be arranged one relative to another in a number of different configurations.

Where the blocks are of square or rectilinear cross section (when viewed end-on) so as to have four similar side faces, openings may be provided in all four faces, and in a preferred arrangement the number of openings in opposite faces is the same, i.e. N openings on one pair of opposite faces and (N + 1) openings in the other pair of opposite faces.

If blocks are of square or rectangular cross section, and are of the same length and joined face to face, overall rectilinear structures can be created in which all faces of the assembled array of blocks will be substantially flat and orthogonal.

If blocks (of the same or different length) are joined with side faces having odd numbers of openings in contact by using one peg to join the central opening in each of the two faces, the blocks can be angled one to the other about a common axis defined by the peg engaging the central holes in the two juxtaposed blocks. Where the blocks have two pairs of opposite faces with an odd number of openings in each face of one pair and an even number of openings in each face of the other pair a plurality of such blocks can be fitted together using the pegs in the central opening in each of the faces having an odd number of openings so that all the blocks are relatively rotatable about a common axis defined by the pegs.

Advantageously a kit of parts forming a construction toy will include a large number of blocks and pegs and will include blocks of differing length and shape.

The pegs may be straight elongate devices and may be constructed from wood or metal or plastics or combinations thereof. Typically they are formed from plastics by injection moulding.

By forming the pegs from a material which is a little more resiliently deformable than the blocks, the pegs may be made a little oversize to allow for manufacturing tolerances in the manufacture of the blocks and in particular the size of the openings.

Where the blocks are hollow, or some or all of the openings extend unobstructed from one face of the block to the opposite face, longer pegs may be employed if desired, to allow blocks to be threaded one after another onto the same peg and the length of the latter is selected accordingly.

In the case of a kit of parts, pegs may be supplied in longer lengths which can be cut to length to suit the blocks into which they are to be fitted.

In one arrangement long lengths of peg may be provided with half-cuts at equally spaced apart points along their length to enable them to be cut or broken into one or a number of unit lengths, the shortest being the length needed to join two blocks.

In order to prevent unwanted interaction between pegs introduced into blocks from end and side faces, at least some of the openings may be blocked so as to prevent a length of peg material from being pushed too far into the block, so that if required a peg can be pushed into every opening in a block without interfering with any other of the pegs already introduced therein.

Where the pegs are of a rigid material the material forming the blocks may need to be resiliently deformable sufficient to allow the pegs to be forced into the openings in the blocks. In this regard if the pegs are circular in cross-section and the openings are non-circular, such as triangular or square or trapezoidal, it may be easier to form the openings in the blocks so as to deform around the pegs as they are pushed therethrough.

In a particularly preferred arrangement the openings may be constructed so as to have radially inwardly protruding teeth in the form of an internal gear wheel, and the pitch diameter of the inwardly directed teeth is the same as the diameter of the peg, so that the latter is held firmly by the teeth when pushed into the opening.

Where the openings are constructed in this way, pegs may be formed with at least one radially protruding rib, (and preferably a pair of opposed ribs), which will engage between the teeth around the opening to resist rotation of such pegs therein.

Where the pegs are formed from rigid material they may be formed with a knee or elbow between two straight ends, so that if the latter re pushed into openings in a pair of blocks, one block will be angled relative to the other by the included angle of the knee or elbow.

Where a peg includes a knee or elbow bend its overall length is preferably increased since the angle introduced by the bend in the peg will prevent the two blocks from fitting together with their adjoining faces in contact, except possibly along an edge.

Alternatively the pegs may be formed from a material which can be bent to form a knee or elbow, but which is sufficiently stiff that it will remain bent.

Thus pre-formed pegs having knee or elbow bends may be provided so that blocks can be fitted together so as to subtend predetermined angles according to the angle of the bend in the selected peg, or two blocks can be fitted together using a bendable peg to allow the angle between the two blocks to be adjusted to whatever is desired.

If the blocks are to be joined end to end using a bendable peg, the two ends of the latter may be inserted into the ends of the two blocks, and gripping the two blocks one in each hand, the peg can be bent into whatever angle is required between the two blocks.

A building, bridge or other structure such as a sports stadium may be constructed by fitting together blocks using pegs as aforesaid, and where a roof or other part of a structure is the extend at other than 90° to an adjoining part of the structure, angled pegs may be employed to join blocks forming the roof or said other part of the structure, to blocks forming the rest of the structure, or instead, or in addition, blocks may be employed in the roof or other parts having a solid triangular or trapezoidal shape with appropriately angled ends or side faces which are secured by conventional straight pegs to end faces pr side faces of blocks forming the rest of the structure.

Where one or more corners of a structure (which when viewed from above is generally rectangular in outline) is to be formed by one or more intermediate sections which extends (or each extend) at less than 90° to the main sides of the structure, but in such a way as to complete the 90° change in direction from one side of the structure to another, the

intermediate sections may be formed from blocks as aforesaid which are joined by pegs which are bent to provide the required changes in direction.

Thus if one intermediate section made up of (say) three elongate blocks end to end, is the extend at 45° from the end of one main side of the structure to the end of an adjoining side, the three blocks may be joined end to end by two straight pegs, and the ends of the assembly of blocks joined to the ends of blocks forming the main and adjoining sides of the structure using pegs having 45° elbow bends.

Alternatively a similar effect may be obtained by constructing the intermediate section from a straight block having square ends and two trapezoidal blocks each having one square end and one 45° end, and joining the blocks together and to the square ends of blocks at the ends of the main and adjoining sides of the structure, using straight pegs.

Likewise where a roof is to extend at (say) 45° to the upper end of a wall made up of blocks as aforesaid, either 45° angled pegs may be employed to join the ends of square ended blocks to the upper face of the top line of blocks making up the wall, so that each roofing block extends upwardly at 45° to the wall.

Where the roofing blocks are to overhang the wall, the same 45° peg may be employed but this time rotated through 180° so that the end of the peg protruding from the top of the wall extends at right angles to the 45° roof line, and a roofing block is fitted thereto by inserting the protruding end of the peg into an opening in the lower side face of the roofing block (instead of into an end face thereof.

Where two 45° roofing blocks meet to form a ridge, the uppermost block of each of the runs of blocks leading to the ridge may be a 45° single ended trapezoidal block, with its square end joined to the next roofing block down, and the juxtaposed 45° trapezoidal ends of the uppermost blocks joined by fitting the opposite ends of a straight peg into the openings in the two 45° end faces thereof.

Alternatively square ended blocks may be employed, and the 90° channel between the adjoining square ends of adjoining pairs of uppermost roofing blocks may be infilled by laying square ended blocks end to end in the channel and joining them end to end, and side faces to end faces of the 45° run of roofing blocks defining the channel, using straight pegs.

Structures may be constructed in a solid format by packing blocks as aforesaid side by side and end to end with or without staggered bonding in the form of conventional brickwork, or may be used to create a framework of struts defining corners and intermediate verticals and horizontals all joined by pegs as appropriate, and if angled parts are required such as a pitched roof or the like, the framework is extended by struts at appropriate angles to the remainder, using bent pegs or trapezoidal blocks as appropriate, and cladding panels are provided having pegs protruding from the rear face thereof by which they can be fitted to the blocks making up the framework, or having openings therein through which pegs can be pushed to engage in openings in the side or end faces of blocks making up the framework.

Where pegs are employed to secure cladding panels they may to advantage have an enlarged head at one end in the form of a nail, which holds the panel captive.

Where the blocks are of square cross section it is advantageous if the smallest basic block comprises a cube and all larger blocks are whole number multiples of the basic block, so that the length dimension of each larger block is equal to a whole number multiple of the edge length of the basic block and the cross section of all blocks is the same and corresponds to the square face of each of the sides of the basic block. By constructing blocks in this way they can be abutted side by side, end to side, or end to end, and the side faces of the abutting blocks which are orthogonal to the surfaces in contact, will be coplanar. Blocks of a different cross section, such as triangular, can be dimensioned in a similar manner.

In general, when building elements are rectilinear it is only possible to create three dimensional structures with planar faces or faces which are stepped inwardly or outwardly by the elemental width of the blocks or a whole number multiple of that width.

However the provision of N openings along one face and N+1 openings along an adjoining face of each block enables blocks to be positioned relative to one another by less than the pitch of the openings.

Whilst it is possible for the basic block to be constructed in accordance with the invention so that on one face it has one central opening and on an adjoining face two openings, symmetrically arranged about the centre of the face, there is an advantage if the basic block is not constructed in accordance with the invention and instead is provided with only one opening central to each of its faces.

This is of particular advantage where the larger blocks have a constant cross section equal to that of the basic cube and are whole number multiples of the basic cube in length, and the pitch of the openings along the faces of the larger blocks is commensurate with the length of the edge of the basic cube, so that if a larger block is equivalent to 3 basic cubes in length, there are 3 openings along one face spaced apart by the length of the basic cube edge in a line parallel to the longer edges of the block midway of the width of the rectangular face of the block with the first and last of the openings in the line therefore separated from the end faces of the block by a distance equal to one half of width of the block, while along an adjoining face of the block there are two such openings spaced apart by a distance equal to the width of the block and each spaced from an end of the block by a distance equal to the width of the block.

Since each block (except the smallest) will have an even number of openings along one face and an odd number of openings along an adjoining face, in which the pitch of the openings along each face is the same, there is a phase difference of one half the pitch between the first opening in each line of openings and if two similar blocks are positioned side by side so that one of the abutting faces has an even number of openings and the other

an odd number of openings, the openings will be aligned to allow one or more pegs to be inserted to join the blocks together, by sliding one block relative to the other through a distance of one half the width of the blocks. The step between the ends of the blocks, so formed, will then be one half the width of the blocks.

If smaller steps are desired, it is within the ambit of the invention to provide twice or three times (or more) as many openings along the same length of block (i.e. by increasing the number of N to 2N, 3N etc.) so that the pitch is now one half or one third (or less) the pitch of the openings if the value of N is related to the number of basic cubes making up the length of the block. However, for most purposes it is considered that, if the basic cube is 10mm x 10mm x 10mm, then the 5mm step obtainable by using a 10mm pitch between openings, is sufficiently small for most modelling purposes.

Using blocks constructed as described allows a tapering stepped structure to be constructed by positioning successively shorter blocks one on the other with their faces containing odd numbers of openings uppermost, and positioning the blocks so that the central openings in the line of openings are aligned one above the other, enabling them to be secured by pegs as described. It is of course essential for this arrangement that all four side faces of each block have lines of openings and for opposite faces to have the same number and spacing of openings.

A particularly useful structure can be created using this principle if a base is formed by securing five 5-element blocks side by side to form a square, with the 5-opening faces uppermost, then positioning four 4-element blocks side by side over four of the 5-element blocks with their 3-opening face uppermost, so that the 3 openings align with the central three openings of the 5 openings below, then positioning three 3-element blocks side by side over three of the 4-element blocks with their 3 openings uppermost, positioning two 2-element blocks side by side over two of the 3-element blocks with the 1 opening face uppermost, and positioning one single element (basic cube) block centrally over one of the 2-element blocks with its single opening aligned with the single opening in the 2-element block therebelow. All of the blocks so arranged can be pinned by long pegs pushed

through from top to bottom of the assembly, (or by separate shorter pegs between each layer of blocks) and if the side face of the last block in each layer is aligned with the corresponding side face of the block below, the opposite side face of the first block in each layer will be stepped back from the corresponding face of the block below by the width of the block, thereby creating something akin to one face of a pyramid albeit with the step size between the ends of the blocks in each successive layer being equal to one half of the width of the blocks.

If two such structures are created and each rotated and placed on a flat surface so that the aligned face of the said last of the blocks in each layer from the base of each structure, and the two structures are positioned and angled so that the right-hand ends of the blocks in one structure are just touching the left hand ends of the blocks of the other structure, the plane containing the right hand ends of the last mentioned structure will be perpendicular to the flat surface on which the structures rest and will also be substantially perpendicular to the corresponding plane containing the left hand ends of the blocks of the other structure.

Two such structures arranged thus can therefore constitute an infill between the square ends of two structures defining one side and one end of an enclosure such as a model stadium or open-air theatre.

Where the latter are tiered with each tier stepped back relative to the one below, the sides and ends can be constructed in a similar way to the infill structures except that all the blocks employed to create the stepped structure are the same length. Although it is possible to envisage using very long blocks, so that the sides and ends of a stadium are of unitary construction, it is envisaged that using a kit of parts for general modelling, long structures could be made up from a number of smaller similar structures arranged and, if desired, joined end to end to make up the larger structure. To this end the largest standard size of block may for example comprise a 5-element block (i.e. 50mm in length by 10mm x 10mm) and if the straight side (or end) of a 5-tiered stadium was for example to be 500mm

in length, ten separate tiered assemblies of 5-element long blocks would be joined end to end to make up the 500mm run.

Different arrangements of infill wedges are possible, and in a particularly preferred arrangement three wedges are constructed, one comprising a tiered array of short blocks (e.g. one or two element blocks) so that its side faces are parallel and vertical (when placed on a horizontal surface) and two triangular wedges are constructed from blocks which increase in length from top to bottom and front to back.

A change of direction may also be accommodated by providing corner blocks which are formed from three similar sections each of which is angled by a small amount relative to the preceding section, so that the end faces of each block, instead of being parallel, are angled relative to one another by for example 22½°, or 30°, or 45°.

By providing a plurality of such corner blocks, of differing overall length but in which the central segment of each block is in the form of a cube, and the segments on each side of the cube are of equal length and equally angled relative to the cube, an array of such corner blocks can be fitted together in a tiered array to form an infill wedge such that two, three or four such wedges can be placed side by side to provide a complete corner assembly between two perpendicular lines of tiered assemblies having square ends.

Alternatively a wedge shaped corner infill may be constructed by using a plurality of regular trapezoidal blocks of differing overall size, the end faces of the trapezoidal blocks being mutually inclined at 22½° or 30° or 45°.

Blocks constructed in accordance with the invention may be in the form of bricks and may be differently coloured.

Blocks may be constructed of clear plastics material to resemble windows, or may be constructed with two opposite faces largely open to provide an opening. A window can then be inserted into the opening if desired or the opening simply left as such.

The invention also envisages the provision of a flat plate or base on which blocks can be arranged and preferably he base has a plurality of openings formed therein in to which the ends of pins fitted into openings in the underside of blocks and protruding therefrom, can be pushed, to anchor the blocks in position on the base.

Typically the openings in the base are spaced apart and positioned thereover so as to correspond to the pitch of the openings in the blocks so that more than one pin can be employed to locate a block in the base, if desired.

The openings may comprise blind holes in the base and the other face may be plain or both faces may be formed with openings with the pattern and positions of the openings different on one face from the other.

Alternatively the openings may comprise through bores from one face to the other so that the pattern and positions of the holes is the same on both sides of the base.

Line patterns pay be printed or engrave on one or both faces of the base indicating the outlines which particular structures which can be assembled thereon should follow, to facilitate the positioning of the first layer of blocks on the base.

Where more than one base pattern is provided on each face the different patterns may be printed, or otherwise formed, in different colours or are otherwise distinguishable.

Where tiered assemblies of blocks are arranged to form a sports stadium or open-air theatre, seats may be provided having pegs protruding from their underside or rear, for insertion into openings in the faces of the tiered blocks.

The seats may be individually formed or more preferably are constructed as joined up lines of seats, typically but not necessarily having lengths which are whole number multiples of the basic cube element hereinbefore referred to, so that lines of seats correspond to the

length of (say) 4 or 5 element blocks or will extend over two or more such blocks when the latter are arranged end to end.

By providing long lengths of seating which extend over two or more block lengths the fitting of the seats to the lines of blocks will further assist in tying together the tiered assemblies of blocks.

Whether individual or formed in lines, the seats may be differently coloured to allow for patterns to be formed by arranging appropriately coloured seats or lines of seats relative to one another.

The colouring of the seats may be by means of self coloured material from which they are constructed or by means of self adhesive coloured patches adapted to be stuck to the seats as required.

In addition to seating cladding panels may be provided for fitting to the front faces of the lowermost layer of blocks to simulate the advertising hoardings which typically are provided around the arena. As with the seating the cladding may be in lengths commensurate with that of the blocks making up the tiered assemblies, or may be longer so as to encompass two or more such blocks joined end to end.

Cladding may be self-coloured or clear to resemble glass panels.

Self-adhesive stickers may be provided for sticking to cladding panels. These may have different designs, be differently coloured, and may depict pictures, windows, doors, architectural features and the like.

In the case of a sports arena or football stadium the area bounded by the tiered assemblies of blocks may be covered by a thin flat panel which may be adhesively backed so that it can be stuck to the base to which the blocks are secured (preferably using which allows the panel to be peeled off after use and re-applied when required) or the panel may be

provided with one or more pegs in its underside, by which it can be secured to the base by pushing the or each peg(s) into an opening in the base.

Where the panel is to extend right up to the front of the bottom layer of blocks the length of the cladding panel(s) (if provided) is preferably adjusted to accommodate the thickness of the panel.

Where a base is provided, sockets may be provided therein, into which the lower end of a block can be pushed. Thus if the cross section of the blocks is 10m x 10mm, the socket will also be (nominally) 10mm x 10mm, so that the cross section of the block is a tight fit therein. This allows elongate blocks (e.g. 5 or 10 elements long) to be upended and secured in place in a more rigid manner than relying on a peg engagement between its lower end and an opening in the base.

If the walls of the socket extend above the surface of the base and the base of the socket is coplanar therewith, the upended blocks will extend upwardly from the base by no more or less than if they were located on the base and secured in place by pegs.

The sockets may be permanently formed, as by moulding, in the surface of the base, or may comprise mouldings having a plurality of pegs protruding from their underside so that they can be securely fitted in place on the base before the block end is pushed therein.

The sockets may comprise square rings defining an appropriately sized opening to receive the end of a block, and the ring is dimensioned so that if positioned on the base with an opening in the base central of the square opening in the ring, pegs on the underside of the ring align with other openings in the base. In this way the alignment of the block when fitted in the ring relative to the base, will be the same as if it were secured in place by a peg.

Self-adhesive (preferably capable of multiple application and removal) labels, similar in size to postage stamps, or smaller, can be provided for sticking to the seats or the cladding

panels. The stickers may be pre-printed to resemble advertisements, or simply coloured to allow coloured patterns to be provided on the tiered assemblies of blocks and/or seating fitted thereto, as is now commonly found in football and sports stadiums.

Roof panels may be pre-formed and adapted to be pegged to the upper layers of blocks in the tiered assemblies so as to extend inwardly over the tiered blocks and to a greater or lesser extent over the arena.

Although described as being constructed in a solid format the tiered assemblies may instead be formed from a lattice of elongate blocks joined by pegs in accordance with the invention, and cladding panels may be provided to simulate the tiered terraces and/or seating and the external walls of the terraces.

Likewise balconies can be constructed by positioning a second tiered assembly at least in part over a lower tiered assembly.

Model scoreboards, press boxes, executive boxes, entrance tunnels, directors boxes, TV cameras and camera boxes, floodlights, goals, flag poles and flags, fencing, sliding roof sections to produce a more completely enclosed arena, may be provided each adapted to be fitted to the base or the tiered blocks or cladding attached thereto, as appropriate, by means of pegs or by self adhesive tabs.

Scoreboards and floodlights may be electrically operable either by a mains transformer unit or from a battery, with switches to control their operation.

A miniature tannoy system may be provided connected to a small P A amplifier and microphone or tape or DC player or digital storage device having recorded announcements, music, singing and/or the crowd noise typical of a stadium such as a football or rugby or cricket match.

Where the arena is to depict for example a football or cricket or rugby pitch, American football or baseball, tennis, show jumping, or an athletics arena, the base or a panel for attachment to the base may be printed or otherwise marked accordingly. Thus the base or panel may depict a running track for an athletics arena.

Accessories for such a model stadium can comprise dug-outs, TV cameras on stands, players, railings and decorative roof rails.

Where the arena is to represent a swimming pool, the base may be cut away in the central area and a shallow watertight tray provided for insertion therein, for filling with water, and model diving boards and the like may be provided for fitting to the base by pegs around the tray forming the pool.

If a depth of water is required, necessitating a deeper tray, a commensurately thicker base may be employed, or a stand may be provided on which the normal (relatively thin) base is fitted, typically by means of pegs as aforesaid, so that the base is now raised by 30 or 40mmfrom the table top or other surface on which the model is supported, to allow for a commensurately deep "pool" tray to be accommodated.

A starter board may be provided with pre-drilled or otherwise formed holes to facilitate the laying out of blocks to create a particular structure.

In the case of a model stadium having roof panels, the latter may be formed in two or more parts so that one can slide relative to another to form a canopy which covers the area of the stadium either partially or completely.

The sliding may be effected manually or electric motors may be provided operated by current from a mains transformer or from batteries.

Where a model is required to have an apex roof, blocks may be constructed with appropriately inclined faces to allow sloping roofs to be constructed and a ridge formed by

appropriate blocks of generally triangular section, all adapted to be joined in accordance with the invention.

Whilst it is envisages that the blocks will normally be small in size (typically 1cm x 1cm square cross section and of 2cm, 3cm, 4cm and 5cm in length - in the case of rectilinear blocks), the invention is not limited to small size blocks. If desired blocks which are five or ten times those typical dimensions may be provided, with appropriately larger size openings for appropriately larger cross section pegs, etc., to enable structures and models to be constructed outside in a garden or parkland setting.

The invention will now be described by way of example with reference to the accompanying drawings in which:-

Fig 1 is an elevation of one face of a single unit building block,

Fig 1A is a perspective view of a pin for joining clocks together and to a baseboard,

Fig 2 is a plan view of the block of Fig 1,

Fig 3 is a perspective view of the block of Figs 1 and 2,

Figs 4-6 are similar views of a 2 unit block,

Figs 5-9 are similar views of a 3 unit block,

Fig 10 is an elevation of a 4 unit block,

Fig 11 is an end view of the 4 unit block,

Fig 12 is a plan view of the 4 unit block,

Fig 13 is a view of the opposite end of the 4 unit block,

Fig 14 is a perspective view of the block of Figs 11-13

Figs 15-19 are similar views of a 5 unit block,

Fig 20A is a plan view showing how differently sized blocks can be stacked to form the tiered terraces of a model stadium and shows in particular how two arrangements of blocks can be fitted between the ends of two runs of terraces forming one side and one end of the stadium seating, to form a 90° corner infill,

Fig 20B is a cross section view of the stacked blocks on the section line BB of Fig 20A,

Figs 21A-21C illustrate three differently angled rod elements which can be fitted into holes in the upper face of the uppermost tier of blocks of an arrangement such as shown in Fig 20A, to provide supports for a cantilevered canopy roof structure over the seating,

Fig 21D is a view of the element shown in Fig 21B in the direction of arrow D in Fig 21B,

Fig 21E is a view of the element shown in Fig 21B in the direction of arrow E in Fig 21B,

Figs 21F and 21G illustrate straight and bent rods for extending elements such as shown in Figs 21A etc.,

Fig 21H illustrates a cylindrical sleeve by which rods such as shown in Figs 21F and 21G can be joined and/or modified for fitting in holes in blocks in the same way as the limbs 98, 100 etc.,

Fig 22 is a front elevation of a row of 4 joined seats which can be fitted to a 4 unit block,

Fig 23 is an end view of the joined row of 4 seats of Fig 22,

Fig 24 is a perspective view of a players entrance/exit tunnel adapted to be fitted to the lower tiers of block seating, such as shown in Fig 20A,

Fig 25 is a perspective view of an executive box which likewise can be fitted to tiered blocks such as shown in Fig 20A,

Fig 26 is a perspective view of a radio and TV commentators box, adapted in a similar way to be fitted to tiered blocks such as shown in Fig 20A,

Fig 27 is a perspective view of a Directors' seating array, forming a Directors' Box, adapted to be fitted to tiered blocks such as shown in Fig 20A,

Fig 28 is an elevation view of a fencing element which can be fitted into holes in a base-plate on which tiered blocks are fitted as shown in Fig 20A, to segregate the pitch or track area from the tiered blocks containing the seating,

Fig 29 illustrates a full-span roof support which is adapted to be fitted at opposite ends into holes in the uppermost tier of blocks,

Fig 30 illustrates a bank of flood lights which can be mounted on the uppermost tier of blocks,

Fig 31 illustrates an alternative array of lights which can be mounted on the uppermost tier of blocks,

Fig 32 illustrates a free-standing bank of floodlights for mounting on a base-board, on which the tiers of blocks are also arranged to form the model stadium,

Fig 33 is a perspective view of another peg for joining blocks together and to a baseboard,

Fig 34 is a perspective view of a corner infill element to replace a plurality of separate differently sized blocks,

Fig 35 is a perspective view of an alternative type of block to allow for corners to be bridged, and

Fig 36 illustrates the printed upper surface of a baseboard having a matrix of holes therein by which blocks and fencing and other accessories can be fitted using pegs as shown in Fig 33.

In the drawings Figs 1 to 19 show differently sized blocks which are joined by pegs or pins 12 such as shown in Fig 1A.

The blocks are dimensioned so as to correspond to a whole number multiple of the basic cuboid block 10 of Fig 1. Thus block 14 of Figs 4-6 corresponds to two cuboid blocks 10 arranged side by side to produce a rectilinear block whose length is twice its end face length or breadth dimension. Likewise the block 16 of Figs 7-9 corresponds to three such cuboid blocks 10 arranged side by side, block 18 of Figs 10-14 corresponds to four cuboid blocks 10 arranged side by side, and block 20 of Figs 15-19 corresponds to five such blocks 10 arranged side by side.

Each of the side faces of the basic cuboid block is provided with a central circular hole, three of faces are shown in Fig 3 as containing holes 22, 24, 26.

The longer blocks have a single hole at each end as at 28 in Fig 6, 30 in Fig 9, 32 in Fig 14 and 34 in Fig 19. However the other rectangular faces do not all have the same number of holes. Instead each of one opposite pair of faces is provided with a line of symmetrically arranges holes corresponding in number to the number of cuboid elements which the block represents (e.g. two holes in the case of the two element block 14, three in the case of block 16 etc.), while the intervening two faces are each formed with one or more holes the number of which is one less than the larger number of holes in the first mentioned pair of

faces. The hole or holes in the intervening faces is/are also symmetrically arranged on the face in a line where two or more holes are provided.

Thus in the case of Block 14 of Fig 6, the upper and lower faces have one hole (such as 36) while the two side faces (one of which is designated 15) have two holes (such as 38, 40).

Similarly the upper and lower faces of block 16 of Fig 9 have two holes (such as 42, 44) while the two side faces (one of which is designated as 17) each have three holes (such as 46, 48, 50).

The holes such as 26, 36, 38 etc. are all of the same cross-sectional shape, typically circular as shown, and have the same diameter. By providing a plurality of pegs such as 12 (see Fig 1A), blocks can be joined by pushing one end of a peg 12 into a hole in one block (e.g. 26 in block 10) and pushing the protruding end of the peg into a hole of another block (such as 36 in a block such as 14), and squeezing the two blocks so that the two faces come into contact.

By making the peg 12 a push fit into each of the holes, once so joined the blocks will tend to remain so.

It is to be noted that by providing one less hole on two of the faces, a single cuboid block such as 10 can be fitted so as to overlie one half or the other of a face 15 of a block such as 14 by using either of holes 38 or 40 to receive the peg which is otherwise fitted in a hole such as 26 in the cuboid block 10. Alternatively the latter can be fitted centrally of the upper face 13 (or the corresponding lower face) of block 14 by fitting the peg 12 protruding from the block 10 into the single central hole 36 in the face of the block 14.

This facility allows an array of blocks to be created having a generally triangular profile when viewed from above or below or from one side or the other, whilst possessing a rectilinear shape for its remaining face. Such arrays can be used to infill the spaces

between the end face of a stack of similar length blocks which have been arranged in layers with each layer above the one below having one less block therein, so as to form a wedge shape having orthogonal rectilinear faces, parallel generally triangular end faces and a stepped or tiered surface corresponding to the hypotenuse of the triangle.

Such an array is shown in Fig 20B and is designated by reference numeral 52. Thus the uppermost layer has only one block 54, the next layer down two blocks 56, 58 and the next down three blocks 60, 62 and 64 and so on. Not all the holes in the opposed faces of the blocks needed to be pegged, and the dotted lines at 66, 68 etc., illustrate how a reduced number of pegs can be used to join together the 15 blocks making up the assembly 52.

The assembly 52 is shown in plan view in Fig 20A as forming part of a line of similar assemblies two other of which are denoted by 70 and 72 and part of a third by 74. Pegs (such as 76, 78) can just be seen bridging between adjacent end faces of the assembled blocks.

A second line of such assemblies 80, 82 etc. is arranged at right angles to the first line of assemblies 52, 70, 72, 74 etc., and the generally gap between the end face 84 of the first line and the perpendicular end face 86 of the second line of assemblies is in-filled by two similar 45° triangular assemblies 89, 90 made up of increasingly smaller sized blocks measured from back to front, as shown.

Each assembly 52, 70, 72, 74, 82, 88 and 90 will have the same cross section shape as that shown at 52 in Fig 20B, and can be thought of as being made up of columns and layers. Thus in Fig 20B the columns are designated A-E and the layers I-V respectively.

Whereas in assemblies such as 52 all the blocks making up all the columns and layers will normally be all the same length, in an assembly such as 88 or 90 the blocks in column A will all be 5 units long, those in column B will all be 5 units long, those in column C all 3

units long, those in column D all 2 units long, and the single block making up column E in layer I is a single unit cuboid block such as shown in Fig 3.

Aligned assemblies such as 52, 70 etc. can be arranged to define the tiered terraces of one longer side of a model stadium. A similar array opposite and parallel to the first, defines the other longer side, and two parallel opposed arrays such as 80, 82 etc., each at right angles to the adjoining longer arrays, will form the two shorter ends of the tiered terraces making up the stadium. Each of the four empty corners can be infilled by two tiered 45° assemblies such as 88, 90 to complete the terracing.

There is of course no limit in theory to the number of terraces which can be created along each side, but since the corners will need to be infilled, longer blocks will be needed if so. Thus if there are to be 10 tiered steps, blocks will be needed of 6, 7, 8, 9 and 10 units of length (one unit corresponding to the cuboid block 10 in Fig 1). In this event the runs of assemblies making up the sides and ends of the stadium can be formed using stacks of longer blocks if desired, thereby reducing the number of different sections making up each side or end. Thus as shown, the assemblies 52 and 70 are shown made up of 4 unit length blocks, and if 8 unit length blocks are available, the two assemblies could be replaced by a single assembly of 8 unit length blocks.

In order to provide a roof or canopy to the model, roof supports are required and different types are shown in Figs 21A-21C. Each comprises a bent wire- or rod-like element 92, 94 or 96 with two similar enlarged ends such as 98, 100 (see Fig 21A) each of whose cross section corresponds to that of the peg 12 of Fig 1A. This enablea it to be fitted into one of the holes in the uppermost layer of blocks (V in Fig 20B) in each of the assemblies such as 52, 70 - 88, 90 etc. in Fig 20A, with one limb (such as 99 in the case of support 92 of Fig 21A) extending inwardly over the tiered blocks. Others can be fitted so as to extend outwardly of the assemblies 72, 70 etc., if a canopy over the outside of the stadium is required.

If the enlarged ends 98, 100 are formed from a plastics material and are cylindrical so that the interior is a push fit over the rod and the exterior is a push fit within a hole (such as for example 42 or 44 in block 16 of Fig 9) extensions to the supports shown in Figs 21A-21C can be formed by pushing straight or bent lengths of rod (such as shown at 95 and 97 in Fig 21F and 21G) of similar gauge, into the open ends of the cylindrical ends (such as 89 in Fig 21A) so as either to extend completely across from one side (or end) of the stadium to the other, or simply to extend the distance which the inwardly (or outwardly) directed limb such as 99 (in the case of supports such as 92) extends over the tiered blocks therebelow. Fig 21D shows the support 94 in the direction of arrow D (in Fig 21B while Fig 21E shows it in the direction of arrow E in Fig 21B. Thus Fig 21E shows the cylindrical configuration of the enlarged end 106 of support 94, and reveals the circular hole 108 within the end face of enlarged end 106, into which another length of rod can be push fitted.

As shown by the broken lines in Figs 21F and 21G the length of the rod can be any convenient length, and can be extended using joining sleeves such as 110 in Fig 21H, each of which corresponds to one of the cylindrical ends such as 98 of Fig 21A.

Model seats can be fitted to the terraces. One example is shown in Figs 22 and 23. Individual seats may be provided each corresponding to 112 (or 114 etc.) of Fig 22 , but more preferably linear arrays of seats are provided (as shown in Fig 22), where a line of 4 seats (112 to 118) is shown joined by a common base 120. Pegs 122, 124 can extend as shown from the base 120 (or from the base of each seat if individual seats are provided), the spacing corresponding to the spacing between holes in a correspondingly sized block. Alternatively the pegs may extend from the rear of the seats such as shown in dotted outline at 126 in Fig 23.

The seats may be differently coloured and by providing a large number of differently coloured seats (and/or different lengths of seating ranging from simple individual seats to lines of four or more), so patterns can be created by selecting and positioning differently

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Claims searched: 1-74 **Date of search:** 11 July 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X Y	X:1-6, 9-19, 25-40, 45, 57-59 & 61 Y: 62, 63	US 4547160	Labelle; see figures 1, 3, 4 and 6; column 2, lines 51-52, column 4, lines 20-21
X Y	X:1-11, 13-19, 31-36, 48, 57-59 & 61 Y: 62, 63	GB 371638	Murphy; see figure 18, 19, 25-29, page 2, lines 63-73 and page 2, line 74-79
X Y	1-6, 9-19, 32-36, 39, 57-59 & 61 Y: 62, 63	US 2132647	Robins; figures 1, 1d, 5 and 5a, page 1, lines 4-6
Y	62, 63	DE 8710893 U	Kleehammer; see figure 1
A		FR 2560060	Prieur; see abstract, figures 1 and 2
A		GB 2108857 A	Sudlow; see figure 1 and abstract

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[V]:

Worldwide search of patent documents classified in the following areas of the IPC[7]:

A63H

The following online and other databases have been used in the preparation of this search report :

Online: WPI, JAPIO, EPODOC

68. A model structure as claimed in claim 66 further comprising cladding panels for fitting to the front faces of the lowermost layer of tiered blocks to simulate the advertising hoardings.

69. A model structure as claimed in claim 65, 66, 67 or 68 further comprising pre-formed roof panels adapted to be pegged to the upper layers of blocks in the tiered assemblies so as to extend inwardly at least over some of the tiered blocks.

70. A model structure as claimed in any of claims 65 to 69 further comprising model scoreboards, press boxes, executive boxes, entrance tunnels, directors boxes, TV cameras and camera boxes, floodlights, goals, flag poles and flags, fencing, and sliding roof sections to produce a more completely enclosed arena, each adapted to be fitted to the base or the tiered blocks or cladding attached thereto, by means of pegs or by self adhesive tabs.

71. A model structure as claimed in claim 70 wherein scoreboards and floodlights are electrically operable.

72. A model structure as claimed in claim 70 or 71 wherein the base or a panel for attachment to the base is printed or otherwise marked to depict a football or cricket or rugby pitch, American football or baseball, tennis, show jumping, or an athletics arena.

73. A model stadium as claimed in any of claims 65 to 72 further comprising accessories comprising dug-outs, TV cameras on stands, players, railings and decorative roof rails.

74. A model stadium as claimed in claim 73 which includes roof panels, formed in two or more parts so that one can slide relative to another to form a canopy which covers the area of the model stadium either partially or completely.

60. Building elements as claimed in any of claims 1 to 56 in which the blocks are constructed of clear plastics material to resemble windows.

61. Building elements as claimed in any of claims 1 to 56 wherein two opposite faces of each block are open.

62. A kit of parts as claimed in any of claims 34 to 42 further comprising a flat base on which blocks can be arranged and having therein a plurality of openings into which the ends of pegss fitted into openings in the underside of blocks and protruding therefrom, can be pushed, to anchor the blocks in position on the base.

63. A kit of parts as claimed in claim 62 wherein the openings in the base are spaced apart and positioned thereover so as to correspond to the pitch of the openings in the blocks so that more than one peg can be employed to secure a block to the base, if desired.

64. A kit of parts as claimed in claim 62 or 63 wherein line patterns are printed or engraved on one or both faces of the base indicating the outlines which particular structures which can be assembled thereon should follow, to facilitate the positioning of the first layer of blocks on the base.

65. A model structure as claimed in claim 49 wherein tiered assemblies of blocks are arranged to form terraces around the playing area of a stadium, or an open-air theatre, wherein seats are provided having pegs protruding from their underside or rear, for insertion into openings in the faces of the tiered blocks.

66. A model structure as claimed in claim 65 wherein the seats are individually formed or are constructed as joined up lines of seats.

67. A model structure as claimed in claim 66 wherein the seats are differently coloured.

56. A kit of parts as claimed in any of claims 34 to 42 further comprising a basic block in the form of a cube and all larger blocks are whole number multiples of the basic block, so that the length dimension of each larger block is equal to a whole number multiple of the edge length of the basic cube block and the cross section of all blocks is the same and corresponds to the square face of each of the faces of the basic cube block, so that each larger block is a K-element block where K is the number of cube blocks which will make up the longer length of the larger block when laid side by side.

57. A method of making a corner infill structure by securing five 5-element blocks as claimed in claim 56 side by side to form a square, with the five-opening faces uppermost, positioning four 4-element blocks side by side over four of the 5-element blocks with their three-opening face uppermost, so that the three openings align with the central three openings of the five openings below, then positioning three 3-element blocks side by side over three of the 4-element blocks with their three openings uppermost, positioning two 2-element blocks side by side over two of the 3-element blocks with the single opening face uppermost, and positioning one single element (basic cube) block centrally over one of the 2-element blocks with its single opening aligned with the single opening in the 2-element block therebelow.

58. A method as claimed in claim 57 wherein the blocks are pinned by long pegs pushed through from top to bottom of the assembly, or by separate shorter pegs between each layer of blocks.

59. A method as claimed in claim 58 in which the side face of the last block in each layer is aligned with the corresponding side face of the block below, the opposite side face of the first block in each layer will be stepped back from the corresponding face of the block below by the width of the block, thereby creating a tiered face such as is found on the sloping face of a pyramid, with the step size between the ends of the blocks in each successive layer being equal to one half of the width of the blocks.

49. A model structure such as a building, bridge sports stadium constructed by fitting together blocks using pegs as claimed in any of claims 1 to 48

50. A model as claimed in claim 49 which includes a roof or other structure which is to extend at other than 90° to an adjoining part of the structure, wherein angled pegs are employed to join blocks forming the roof or said other structure, to blocks forming the rest of the structure.

51. A model as claimed in claim 49 or 50 wherein blocks are employed in the roof or other structure having a solid triangular or trapezoidal shape with appropriately angled ends or side faces which are secured by conventional straight pegs to end faces or side faces of blocks forming the rest of the structure.

52. A model structures constructed as claimed in claim 49 in which the blocks are fitted to form a solid mass by packing blocks side by side and end to end with or without staggered bonding in the form of conventional brickwork.

53. A model structure as claimed in claim 49 in which the blocks are joined to create a framework of struts defining corners and intermediate verticals and horizontals all joined by pegs as appropriate.

54. A model structure as claimed in claim 52 or 53 in combination with cladding panels having pegs protruding from the rear face thereof by which they can be fitted to the blocks making up the solid mass or the framework, or having openings therein through which pegs can be pushed to engage in openings in the side or end faces of blocks making up the mass or the framework.

55. A model structure as claimed in claim 54 wherein each of the pegs employed to secure cladding panels to the mass or framework has an enlarged head at one end in the form of a nail, which holds the panel captive.

42. A kit of parts as claimed in claim 41 wherein the length between half-cuts equals the length needed to join two blocks.

43. Building elements as claimed in any of claims 1 to 33 in which at least some of the openings are blocked at a predetermined depth, so as to prevent a length of peg material from being pushed too far into the block, so that a peg can be pushed into every opening in a block without interfering with any other of the pegs already introduced therein.

44. Building elements as claimed in any of claims 1 to 43 wherein the pegs are formed from a rigid material and the material forming the blocks is resiliently deformable sufficient to allow the pegs to be forced into the openings in the blocks.

45. Building elements as claimed in any of claims 1 to 44 wherein the pegs are formed from a rigid material and the openings in the blocks are constructed so as to have radially inwardly protruding teeth in the form of an internal gear wheel, and the pitch diameter of the inwardly directed teeth is the same as the diameter of the peg, so that the latter is held firmly by the teeth when pushed into the opening.

46. Building elements as claimed in claim 45 in combination with pegs which are formed with at least one radially protruding rib to engage between the teeth within the opening to resist rotation of the peg therein.

47. Building elements as claimed in any of claims 1 to 46 wherein the pegs are formed from rigid material and are formed with a knee or elbow between two straight ends, so that if the latter are pushed into openings in a pair of blocks, one block will be angled relative to the other by the angle of the knee or elbow.

48. Building elements as claimed in any of claims 1 to 44 wherein the pegs are formed from a material which can be bent to form a knee or elbow, and which is sufficiently stiff that it will remain bent.

33. A building element as claimed in claim 31 wherein there are N openings on one pair of opposite faces and (N+1) openings in the other pair of opposite faces.

34. A kit of parts forming a construction toy comprising a plurality of building elements as claimed in claim 1 and a plurality of pegs wherein the building elements comprise blocks of differing length and shape.

35. A kit of parts as claimed in claim 34 wherein the pegs are straight elongate devices.

36. A kit of parts as claimed in claim 34 or 35 wherein the pegs are constructed from wood or metal or plastics or combinations thereof.

37. A kit of parts as claimed in claim 36 wherein the pegs are formed from plastics by injection moulding.

38. A kit of parts as claimed in claims 34, 35, 36 or 37 wherein the pegs are formed from a material which is more resiliently deformable than the blocks

39. A kit of parts as claimed in nay of claims 34 to 38 wherein the blocks are hollow or some or all of the openings extend unobstructed from one face of the block to the opposite face, and elongate pegs are employed on which two or more blocks can be threaded one after another.

40. A kit of parts as claimed in any of claims 34 to 39 wherein at least some of the pegs are supplied in long lengths which can be cut to length to suit the blocks into which they are to be fitted.

41. A kit of parts as claimed in claim 40 wherein long lengths of peg are provided with half-cuts at equally spaced apart points along their length to enable them to be cut or broken into one or a number of unit lengths.

25. Building elements each constructed in accordance with any of claims 1 to 23 wherein the blocks are differently coloured.

26. Building elements each constructed in accordance with any of claims 1 to 23 wherein one end face of each block is differently coloured from the other.

27. Building elements each constructed in accordance with any of claims 1 to 23 wherein side faces of each block are differently coloured one from another and/or from the end faces.

28. Building elements as claimed in any of claims 1 to 23 in which one or more faces of each of the blocks is/are colour coded to indicate a specific function the block is designed to perform.

29. Building elements as claimed in any of claims 1 to 23 wherein side faces of the blocks having an even number of openings are one colour and side faces having an odd number of openings are another colour.

30. Building elements as claimed in any of claims 1 to 29 wherein the colouring of one or more faces of the blocks involves colouring the whole of the face or only a part of the face, or involves colouring only the entrance to the interior of the opening or openings in the face.

31. A building element as claimed in any of claims 1 to 30 wherein each block is of square or rectilinear cross section (when viewed end-on) so as to have four similar side faces, and openings are provided in all four faces.

32. A building element as claimed in claim 31 wherein the number of openings in opposite faces is the same.

15. A building element as claimed in any of claims 1 to 13 formed from a plastics material by moulding, typically injection moulding.

16. A building element as claimed in any of claims 1 to 15 wherein one side face of a block may be left open.

17. A building element as claimed in claim 16 wherein a separate panel is removably fitted to close the opening.

18. A building element as claimed in any of claims 1 to 17 in which each block is of constant cross section from one end face to the other.

19. A building element as claimed in claim 18 in which the block cross section is square, rectangular, triangular, trapezoidal or hexagonal.

20. A building element as claimed in any of claims 1 to 17 in which at least one of the side faces of the block is curved.

21. A building element as claimed in any of claims 1 to 20 in which the or each end face is inclined to some of the sides so that the block comprises a solid trapezium.

22. A building element as claimed in claim 21 wherein both ends are so inclined and both are inclined by the same amount so as to form a so-called regular solid trapezium.

23. A building element as claimed in claim 21 or 22 in which the acute angle between the or each end and one of the parallel sides is 75°, 67.5°, 60° or 45° so that if placed end to end with a similarly shaped block, the length dimension or axis of one block can subtend an angle of 30°, 45°, 60°, 75° or 90° respectively to that of the adjoining block.

24. Building elements each constructed in accordance with any of claims 1 to 23 wherein the blocks are all the same colour.

are non-rotatable within the openings in the faces of the blocks, so that when joined to one or more other blocks, the interengagement of the peg or pegs will prevent relative rotation between blocks and will maintain whatever chosen alignment has been selected.

8. A building element as claimed in claims 1, 2 or 3 wherein the openings are triangular, square or hexagonal in cross section in combination with two types of peg, one type having a cross section corresponding to that of the openings and dimensioned to be a push fit within the openings, so that when two blocks are joined thereby, no relative rotation between the two blocks can occur, and the other type having a circular cross section of a diameter such that the peg is received as a push fit within the non-circular openings, so that if relative rotation is required this can be achieved by using a circular cross section peg instead of a non-circular cross section peg.

9. A building element as claimed in any of claims 1 to 7 having a number of openings which corresponds to its length.

10. A building element as claimed in claim 9 wherein the element is rectilinear and has one opening in the centre of one face and two openings in an adjoining face.

11. A building element as claimed in claim 9 wherein there are two openings in one face and three on an adjoining face.

12. A building element as claimed in claim 9 wherein there are three openings on one face and four on an adjoining face.

13. A building element as claimed in any of claims 1 to 12 constructed so as to be solid or hollow.

14. A building element as claimed in any of claims 1 to 13 constructed from wood or metal or plastics or a combination of any of the aforesaid.

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CLAIMS

1. A building element which is securable to other similar building elements for creating a basic structure comprises a block having similarly proportioned side faces and two similarly proportioned end faces each of which includes at least one opening therein for receiving a peg by which an end face of one block can be joined to the end face of another, and wherein one of the side faces includes N spaced apart openings and an adjoining side face includes (N+1) spaced apart similar openings, where N is a whole number equal to or greater than 1, and the openings in the side faces are also for receiving pegs by which blocks can be joined or secured in place.

2. A building element as claimed in claim 1 in which the openings are equally spaced apart.

3. A building element as claimed in claim 1 or 2 in which the openings are arranged centrally of the side face.

4. A building element as claimed in claim 1, 2 or 3 in which the openings in the side and end faces are all the same size so that the pegs for joining blocks end to end or side face to side face can also all be the same size.

5. A building element as claimed in claim 4 wherein the cross-sectional shape of each peg is circular.

6. A building element as claimed in claim 5 in which circular cross section pegs fit in circular holes, whereby one block can be rotated relative to another.

7. A building element as claimed in claim 4 wherein the cross-sectional shape of each peg is triangular, square, or hexagonal, and the holes are shaped accordingly so that the pegs

If the included angle between the end face 174, 176 is 45° two such assembles will snugly fit in the 90° corner between side and end stacks as is Fig 20A.

The baseboard shown in Fig 36 is shown to a very reduced scale relative to the blocks and accessories shown in the other Figures in the drawings.

Although not shown the baseboard is typically 10mm thick and includes a matrix of holes in its upper surface into which pegs (such as 12 in Fig 1A or 169 in Fig 33) can be push-fitted to allow blocks and accessories to be secured to the board.

As shown the board may be pre-printed to denote a football pitch in the centre and to denote where the stacks of blocks are to be located to form the terraces around the pitch.

The other side of the baseboard (not shown) may be similarly formed with a matrix of holes for receiving pegs, and may be plain or pre-printed with a different pattern in the central area such as a track for athletics or running events, a rugby pitch, a baseball pitch, an American Football pitch or the like.

Alternatively the central area can be covered by a pre-printed sheet of paper or plastics sheet or the like, different sheets denoting a different pitch or layout.

An alternative corner infill element is shown in Fig 34 in which a predetermined number of terrace tiers are moulded as a single unit 162, for example from rigid plastics material. The unit is formed with plane flat side faces one of which is denoted by reference numeral 164.

By making the included angle between the two side faces such as 164 equal to 45°, so two such units will just fit snugly between the two perpendicular end faces of two lines of stacked terraced blocks (such as 84 and 86 in Fig 20A). Holes such as 166, 168 etc. are provided in the mouldings to allow them to be fitted together and to the end faces of adjoining stacks of blocks using pegs (such as shown at 12 in Fig 1A).

Additionally the horizontal and vertical faces of the tiered face are also provided with similarly sized and spaced apart holes to allow seating units to be fitted thereto. Preferably any such seating units are also curved and are of different lengths to accommodate the different arcuate extent of the different tiers.

The pegs may be smooth as shown in Fig 1A or may be ribbed or grooved as shown in the modified peg 169 in Fig 33.

As an alternative to the one-piece corner moulding of Fig 34, more accurately fitting corner units may be constructed using a plurality of differently sized angled blocks of the type shown at 170 in Fig 35. Thus a range of sizes may be provided ranging from a block whose inner end-face to end-face extent is the same as a single unit block (such as 10 in Fig 3) but whose outer end-face to end-face extent corresponds to a two unit block (such as 14 in Fig 6), up to the largest multiple unit block size. By stacking them in a similar manner as shown in Fig 20B a wedge shaped assembly will be formed whose end faces are plane and flat (as is 164 in Fig 34) and whose front face is terraced, each tier of the terrace corresponding to the upper and front face of a block similar to that of Fig 35 but varying in arcuate extent from the bottom of the stack to the top.

coloured seats (or seat arrays) on the terraces of blocks, so as to form emblems or patterns, or letters making up words.

The stadium can be made more lifelike by adding accessories such as a players' (or competitors') entrance tunnel 128 as shown in Fig 24, an executives' box 130 as shown in Fig 25, a directors' box containing special seating (which may for example comprise a single matching array of seats) as shown at 132 in Fig 27, a Press Radio and TV commentators box as shown at 134 in Fig 26, and fencing or rails such as shown at 136 in Fig 28. In each case pegs such as 138, 140, 142 and 144 protrude downwardly from the underside of each item for pushing into holes in the blocks making up the terraces, or into holes in a baseboard (see Fig 36). Thus where the item is to be fitted over a number of tiers of a terrace, the underside of the item is stepped as shown at 146 in Fig 24.

Where a roof is to span from one side of a stadium to the other, curved struts such as 148 in Fig 29 may be provided each being provided with a foot 150, 52 having a peg 154, 156 protruding downwardly therefrom for engagement in a hole in a block in or fitted to the uppermost tier of the terrace.

Where a vertical gap is to exist between the terraces and the underside of the roof span (to give headroom above the highest tier) the pegs 154, 156 may be formed with circular central openings in which short straight rods can be fitted the other ends of which can be fitted into sleeves (such as 110 in Fig 21H) to allow them to be push fitted into the holes in the uppermost tier of blocks.

Alternatively blocks can for example be mounted end-on at intervals around the uppermost tier of blocks, using pegs (such as 12 in Fig 1A) and the pegs 154, 156 can be push fitted into openings in the blocks - in the upper end faces of the blocks if the latter are located end-on.

Further accessories are illustrated in Figs 30-32 each adapted by pegs (such as 158, 160 in Fig 30) to be push fitted into blocks or into a baseboard such as shown in Fig 36.